APPENDIX D

PRELIMINARY WATER AND SEDIMENT SAMPLING PLAN TO ADDRESS IDENTIFIED DATA GAPS

TOTAL MAXIMUM DAILY LOAD (TMDL) DEVELOPMENT FOR METALS
PROSPECT CREEK WATERSHED
SUPPLEMENTAL MONITORING PLAN

1.0 Objectives

Prospect Creek, a tributary to the Clark Fork River, is located in northwest Montana west of Thompson Falls. This Supplemental Monitoring Plan for the Prospect Creek Watershed outlines proposed surface water data collection activities to support development of a metals TMDL for the watershed. The objectives of these monitoring activities include:

- Fill data gaps identified during the Data Compilation/Source Assessment portion of the TMDL process;
- Further delineate metals loading sources and trends in the watershed; and
- Better quantify seasonal water quality criteria exceedances in the watershed under current conditions.

These objectives are intended to achieve the overall goal of obtaining a set of representative water quality data to complement the existing database for the Prospect Creek watershed, allowing refinement of the metals TMDL for Prospect Creek. The general nature and location of potential metals source areas were identified in the Data Compilation and Source Assessment based on the current dataset; however, the additional data collection activities proposed in this plan address uncertainties in source delineation as follows:

- Additional surface water monitoring locations are proposed to better delineate metals loading trends in Prospect Creek and to provide data on potential metals loading from significant tributary drainages;
- Analysis of both total recoverable and dissolved metals is proposed, to aid in determining the potential contribution of metals-bearing groundwater to surface water metals loads; and
- Stream sediment sampling is proposed to evaluate the potential for bed sediments to act as a source of metals loading under certain conditions, and/or contribute to impairment conditions.

2.0 Monitoring Sites

Proposed monitoring sites for the supplemental monitoring in the Prospect Creek Watershed are shown on Figure D-1. A total of 19 surface water monitoring sites are proposed, including nine existing surface water sites sampled during previous monitoring activities, and nine new sites. The new sites are categorized as primary (seven sites) and secondary (three sites), with the primary sites considered to be most critical for filling data gaps (Figure D-1). Primary sites are located in lower Antimony Creek, upper and lower Cox Gulch, at the mouth of Crow Creek and Cooper Gulch, and

on the mainstem Prospect Creek above the confluence with Antimony Creek and downstream of the confluence with Buster Brown Gulch. Secondary sites include middle Cox Gulch, lower Therriault Gulch, and mainstem Prospect Creek upstream of Lucky Boy Gulch. In combination with the nine existing monitoring sites, this monitoring network will greatly increase current knowledge of the nature and distribution of metals loading sources in the drainage, and allow for more specific load allocations.

In addition to the surface water monitoring, four sediment sampling sites are proposed. The proposed sediment sampling sites correspond with existing surface water monitoring sites S-2 and S-5, and the proposed sites in lower Antimony Creek and lower Cox Gulch. All proposed monitoring locations are described in Table D-1. If macroinvertebrate sampling is pursued in conjunction with the sediment sampling, then standard MDEQ sampling and analysis protocol will be used.

3.0 Analytical Parameters

The analytical parameter list for water and sediment samples is shown in Table D-2. The laboratory parameter list for water includes total recoverable and dissolved metals (to assist in identification of metals loading sources), calcium and magnesium (for hardness calculations to evaluate hardness-dependent water quality criteria), sulfate (a relatively conservative constituent potentially indicative of mining-related sources), and total dissolved solids. Field-analyzed parameters will include pH, specific conductance (SC), dissolved oxygen, water temperature, and flow. Sediment samples will be analyzed for total metals.

4.0 Monitoring Schedule

Synoptic surface water monitoring will be conducted at all locations under both high and low flow conditions to further assess seasonal variability in metals concentrations and loads, and to evaluate the relative impact of loading sources during high and low flow conditions. Based on the hydrograph obtained from the USGS gage at the mouth of Prospect Creek, high flow sampling would be conducted in April or May, and low flow sampling in August or September. It is likely that some of the monitoring sites will be dry during the low flow sampling event.

5.0 Quality Control/Quality Assurance

During each monitoring event, field quality control (QC) samples will be collected to aid in the evaluation of data quality. Field QC samples will include:

- One field duplicate sample pair; and
- One blank sample.

The duplicate sample pair will consist of two sets of sample bottles, labeled with different sample code numbers, and collected from the same sampling location at the same time. The laboratory will not be made aware that the two samples are from the same location.

The field blank sample will consist of deionized (reagent-free) water, collected in sample bottles and preserved as appropriate for the desired analysis. The blank sample for dissolved metals will be filtered using the same type of filtration equipment used for surface water samples.

Additional quality assurance for data collection activities will be provided by adherence to Standard Operating Procedures (SOPs) for surface water sampling available from MDEQ at http://www.deq.state.mt.us/wqinfo/monitoring/SOP/sop.asp. Laboratories selected to analyze samples collected under this plan will also be required to analyze and provide results for standard laboratory QC samples, including laboratory blanks, duplicates, control standards, and spike samples.

Table D-1. Prospect Creek Supplemental Surface Water Monitoring Locations

Existing Site	New Site*	Description	Rationale for New Sites
S-6A		Prospect Creek below Therriault Gulch	
	S	Mouth of Therriault Gulch	Assess potential loading from Therriault Gulch
	P	Mouth of Crow Creek	Assess potential loading from Crow Creek
S-5**		Prospect Creek above Crow Creek confluence	
	S	Prospect Creek above Lucky Boy Gulch confluence	Further assess loading trends through mainstem Prospect Creek and assess potential loading from Lucky Boy Gulch
	P	Prospect Creek below Buster Brown Gulch	Further assess loading trends through mainstem Prospect Creek and assess potential loading from Buster Brown Gulch
	P**	Cox Gulch above Prospect Creek confluence	Assess potential loading from lower Cox Gulch
S-2**		Prospect Creek opposite mouth of Everson Gulch	
S-11		Cox Gulch above mill	
	S	Cox Gulch, near drainage midpoint	Further assess loading trends in Cox Gulch
	P	Cox Gulch at upstream end	Further assess loading trends in Cox Gulch
S-1		Prospect Creek above USAC mill site at bridge	
	P**	Mouth of Antimony Creek	Further assess loading trends in, and document total metals load from, Antimony Ck
A-1		Upper east fork Antimony Gulch	
A-2		Upper west fork Antimony Gulch	
A-3		Lower east fork Antimony Gulch	
A-4		Lower west fork Antimony Gulch	
	P	Prospect Creek above Antimony Gulch confluence	Assess potential metals load in Prospect Ck upstream of Antimony Ck
	P	Mouth of Cooper Gulch	Assess potential loading from Cooper Gulch

NOTE: *P = primary proposed site; S = secondary proposed site
**Proposed sediment monitoring location

Table D-2. Prospect Creek Supplemental Surface Water Monitoring Water and Sediment Analytical Parameter List

Parameter	Detection Limit (µg/L)
Field Parameters	
PH	Na
specific conductance	Na
dissolved oxygen	Na
water temperature	Na
Flow	Na
TSS	Na
Metals	
Antimony	3
arsenic	5
cadmium	0.1
copper	1
iron	30
lead	2
manganese	10
zinc	10
Major Minerals	
Calcium	1,000
Magnesium	1,000
Sulfate	1,000
Total dissolved solids	10,000
Sediment Parameter List	
Parameter	**Detection Limit (mg/Kg)**
antimony (total)	5
arsenic (total)	5
lead (total)	5
zinc (total)	5

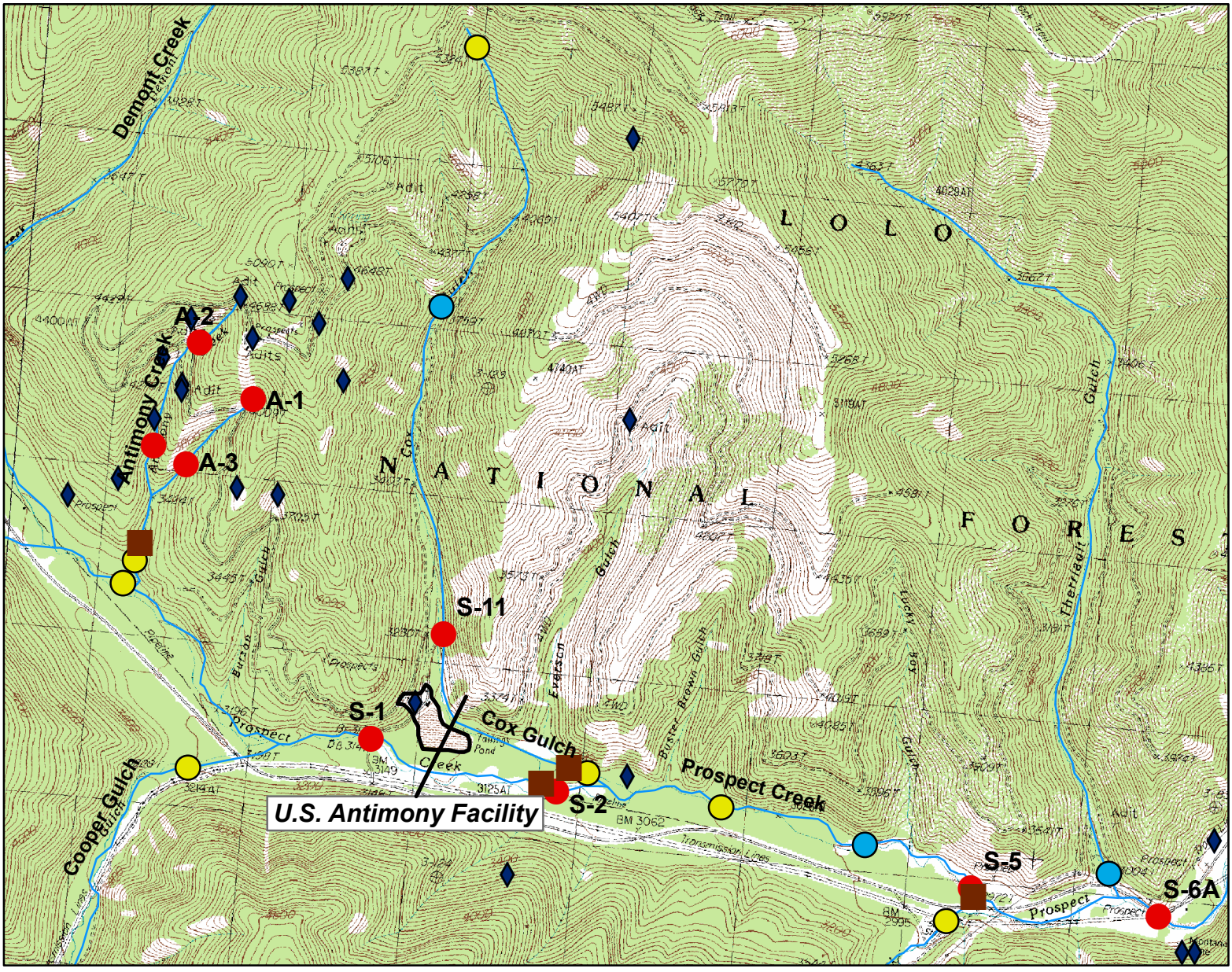
NOTE: metals will be analyzed for both total recoverable and dissolved (field-filtered through 0.45 µm filter) concentrations in water samples and total metals based on acid digestion in sediment samples.

Proposed Monitoring Sites

- Primary Proposed Surface Water Site
- Secondary Proposed Surface Water Site
- Proposed Sediment Site
- Prospect Creek Watershed Major Streams

N

- Abandoned Mine Sites
- Existing sample locations



0 0.25 0.5 1 Miles

Figure D-1
Prospect Creek Watershed
Exisiting and Proposed Monitoring Locations

Basemap layers from Montana Natural Resources Information System
Monitroing site locations from EPA STORET, USGS NWIS, MDEQ